

Pan Sharpening

PAN SHARPENING

The PANSHARP algorithm applies an automatic image fusion that increases the resolution of multispectral (color) image data by using a high-resolution panchromatic (B&W) image. Most Earth resource satellites, such as SPOT, IRS, Landsat 7, IKONOS, and Quickbird, provide multispectral images at a lower spatial resolution and panchromatic images at a higher spatial resolution. This allows you to easily fuse images acquired simultaneously by the same sensor. Alternatively, you can fuse images from different sensors.

The GRNEHN algorithm is an effective post processing algorithm that can produce a more natural result in the green band which is closer to what is found in aerial photography

PANSHARP works with 8-bit, 16-bit, or 32-bit real data types.

MODULE PREREQUISITES

Pan Sharpening is an add-on to Geomatica.

PANSHARP ALGORITHM

The PANSHARP algorithm is based on the least number of squares to an approximate gray-value relationship between the original multispectral image, panchromatic image, and fused image. Using the PANSHARP algorithm, you can:

- Solve color-distortion and operator- and data-dependency problems
- Achieve the best color representation
- Preserve the mean, standard deviation, and histogram shape for each channel
- Fuse all spectral bands of a satellite image with the corresponding panchromatic band at once

- Minimize color distortion, maximize feature detail, and naturally integrate color and spatial features

THE GREENESS ENHANCEMENT ALGORITHM

The GRNEHN algorithm included in the pan sharpening workflow, produces a more natural dataset when working with satellite data and can provide a better match with actual photos, as it improves the green band in the output image.

PANSHARP INPUT IMAGES

The PANSHARP algorithm requires the following input images:

Multispectral Image Layers:

- Spectral layers fused with a high-resolution panchromatic image layer
- Reference Multispectral Image Layers:
 - Aid in the pan-sharpening process
 - Span the same frequency range as the panchromatic image layer
 - Vary from sensor to sensor
- Panchromatic Image Layer:
 - Used for pan-sharpening multispectral image layers

PANSHARP OPTIONS

The PANSHARP algorithm offers:

- Enhanced pan sharpening:
 - Generates a refined pan-sharpened output image
 - "Yes" option: generates a refined pan-sharpened output image (more suitable for visualization or visual interpretation purposes)
 - "No" option: generates a standard pan-sharpened output image (more suitable for digital classification purposes)
- No-data image value:
 - Specifies a background value for all layers
- Pyramid options:
 - Specifies the type of resampling to use when computing overview

Technical Specifications

levels (Nearest Neighbor, Average, or Model)

FOR BEST RESULTS

When using the PANSHARP algorithm, it is recommended that you:

- Use multispectral-image channels whose wavelengths lie within the frequency range of the panchromatic image channels
- Do not exceed the ratio of resolutions between the two images by more than 5:1
- When working with satellite data, use the GRNEHN algorithm as a post-processing step after running the PANSHARP algorithm

The Pan Sharpening and Greenness Enhancement techniques were developed by Professor Yun Zhang, and are licensed from the University of New Brunswick.

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